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Abstract: Integrated Passive Devices for Space Applications

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This paper will describe a new area of effort at NASA/JPL, which is an evaluation for feasibility and a study of reliability of the use of integrated passive devices in various substrate types including flexible high density interconnect, low temperature cofired ceramic and conventional rigid polyimide board technologies for suitability for space flight applications. We will not address integrated passive elements in silicon, as other ongoing efforts at JPL/University of Arkansas are already being performed. We will briefly review a summary of current industry capability in the technologies of interest to us. Our work involves construction of both test coupons for an extensive reliability test series and of actual demonstration circuits in various substrate technologies for a comparison of electrical performance. We will be discussing the efforts involving only the test coupons here. These coupons contain structures of resistors, capacitors, and inductors, and they have been fabricated by several different suppliers so that various base material formulations are included. The test coupons are undergoing thermal shock, thermal cycle, thermal vacuum, radiation exposures, vibration testing, and sustained extreme temperature operation. The materials used in all the passive element structures will be discussed. Electrical performance achieved before and after the test series will be presented. The remaining work to be finished will be reviewed.